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EXAMINER
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ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/30/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/721,505

Applicant(s)

TANI ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 and 17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

This correspondence is being submitted in reply to applicant's paper dated 12/05/06. The applicant has overcome only the objections and the 35 USC 112 rejections. None of the prior art rejections have been satisfactorily overcome except for the art rejections of claims 14-16 which were cancelled by the applicant. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments and remarks. Therefore, the present claims (including new claim 17) are finally rejected over the same grounds of rejection as set forth hereunder and for the reasons of record:

### ***Claim Disposition***

1. Claims 14-16 have been cancelled.

### ***Drawings***

2. The drawings were received on 12/05/06. These drawings are acceptable.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, 9-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of Landsman et al 3956014.

The present application is directed to a method for producing a membrane electrode structure wherein the disclosed inventive concept comprises the specific step of forming a water repellent layer and a hydrophilic layer. An electrical apparatus and a transport machine are also embraced.

As to claims 1 and 17:

(*Emphasis added*→) The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in FIGURE 15 and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of

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catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1<sup>st</sup> full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2<sup>nd</sup> full paragraph on page 1*).

As to claims 2-3 and 9-13:

*Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.*

**(Emphasis added→)** The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8

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was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer.

Landsman et al disclose a method of making a structured electrochemical cell structure (TITLE) for gas diffusion electrodes used in fuel cells (COL 1, lines 7-10) including forming alternate layers of porous hydrophobic material and porous hydrophilic catalyst-containing material. The electrode is formed by depositing the alternate layers of material (ABSTRACT/CLAIM 4). The deposition of layers also includes bonding them together by using pressure and heating them at certain temperatures (hot pressing) so as to laminate (*formation of layers*) (COL 5, lines 25-32). A mixture containing water, Teflon and a catalyst dispersion and carbon black is used to form the hydrophilic material based on certain desirable compositions (COL 5, lines 1-42). Pt supported on carbon black is disclosed (COL 3, lines 1-3). Catalyst provides the hydrophilic property (COL 1, lines 18-22). *These materials exhibit conducting and ion-conducting properties.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of Landsman et al in the membrane electrode structure of the AAPA as Landsman et al teaches his method of including hydrophilic layers provide an electrochemical cell electrode structure having clearly defined hydrophobic and hydrophilic passages in which the catalyst can be

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located at the interfaces therebetween in a manner producing maximum catalyst utilization and minimum resistance to the flow of reactants, products, ions and electrons. Additionally, forming layers of hydrophilic materials per se prevent unwanted agglomeration of particles which may result either in waste of catalyst or poor ionic and electronic conductance.

6. Claims 1-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of Heffler 4104197.

As to claims 1 and 17:

(*Emphasis added*→) The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in FIGURE 15 and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

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The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1<sup>st</sup> full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2<sup>nd</sup> full paragraph on page 1*).

As to claims 2-3 and 9-13:

*Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.*

*(Emphasis added→) The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.*

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The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer; the specific pore size; the specific content of ion-conducting material; and the specific surface roughness characteristics.

As to claim 1:

Heffler discloses a method of making gas diffusion electrodes for electrochemical cells (TITLE/CLAIM 1), the method includes forming a hydrophobic layer comprising mixing coal powder with PTFE in a suspension medium; forming a hydrophilic layer comprising mixing catalyst containing activated carbon powder with PTFE in a suspension medium; superposing (*laminating*) the hydrophilic and hydrophobic layers, and sintering the layers together with heat and under pressure to form the electrode (CLAIM 1/COL 2, lines 62-65).

As to claim 4:

Heffler disclose that the most frequent pore diameter of the hydrophobic and hydrophilic layers is 1.8 microns and 0.08 microns, respectively (CLAIM 1).

As to claims 5-6:

Heffler disclose that for the production of the working layer 2 (hydrophilic layer): 35 g of activated carbon with a particle size of 0.5 microns and the applied Pt catalyst are used and they amount to about 10 % by wt, additionally about 18 % wt PTFE and 17 % wt polyethylene in 200 ml hexane is used (COL 2, lines 51-60).

As to claims 7-8:

Since Heffler disclose certain materials for the production of the hydrophilic layer per se (COL 2, lines 51-60). *It is contended that the claimed maximum height of surface roughness as*

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*well as the surface roughness ratio are inherent properties or characteristics of the material. Particularly, since the recited hydrophilic layer material covers a very large number of applicable materials which can be used therefor, it is also contended that any hydrophilic layer comprising any combination of conducting and ion-conducting materials would produce a hydrophilic layer exhibiting the specifically claimed maximum height of surface roughness as well as the surface roughness ratio*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of Heffler in the membrane electrode structure of the AAPA as Heffler teaches the formation and lamination of the specific hydrophilic layer in combination with a hydrophobic layer provides the advantages of achieving a low power loss, compared to pure oxygen operation, in a power independent of the humidity of air, and in quick setting times of the load potentials (COL 1, lines 51-56). Thus, it reduces power drop in the operation of the electrode (COL 1, lines 38-42). In addition to that, it also provides a gas diffusion electrode which is simple in design, rugged in construction and economical to manufacture (COL 1, lines 65-68).

With respect to the specific pore size and the specific content of ion-conducting material, the invention as whole would have been obvious to a person with ordinary skill because Heffler discloses that the selected fractions of materials (composition) represents the optimum between the opposing parameters of electric conductivity and permeability, on the one hand, and hydrophobic or hydrophilic behavior, on the other hand. Additionally, Heffler discloses that due to pore size and porosity gas permeability is good, thereby cell potential as whole is improved. As a result, Heffler use/disclose the specific pore size and the specific content of ion-conducting

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material as variables that achieve a recognized result. Therefore, the specific pore size and the specific content of ion-conducting material are construed as result-effective variables, and the discovery of optimum of result effective variable in a known process is ordinarily within the skill of art. *In re Boesh* 205 USPQ 215 (CCPA 1980). *In re Aller* 105 USPQ 233, 235; *In re Hoeschele* 160 USPQ 809, *In re Antonie* 195 USPQ 6 (MPEP 2144.05 II. Optimization of Ranges). Generally, differences in concentration (content) will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)

7. Claims 1-3, 9-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of Goldsmith 4568442.

As to claims 1 and 17:

(**Emphasis added**→) The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

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The AAPA illustrates in **FIGURE 15** and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1<sup>st</sup> full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2<sup>nd</sup> full paragraph on page 1*).

As to claims 2-3 and 9-13:

*Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.*

*(Emphasis added→)* The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer.

Goldsmith disclose a method for the preparation of a gas diffusion composite electrode (CLAIM 8) for fuel cells (COL 1, lines 8-10) including a hydrophilic layer (CLAIM 8/ COL 6, lines 30-65/COL 2, lines 54-65) and laminating said layer to a current distributor and a backing layer comprising a hydrophobic polymer and a pore forming material and sintering said layers (CLAIM 8/ COL 6, lines 45-60/ COL 2, lines 54-65). The hydrophilic layer is composed of a single homogenous layer comprising a hydrophobic polymer and a major amount of a hydrophilic material such as carbon black in an aqueous dispersion (COL 5, lines 62-68); PTFE is also used (COL 6, lines 7-25/ COL 2, lines 54-65). *These materials exhibit conducting and ion-conducting properties.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of Goldsmith in the membrane electrode structure of the AAPA as Goldsmith reveals that by further

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laminating a hydrophilic layer in a gas diffusion electrode, the tendency of the prior art gas diffusion composite electrodes to flood or wet-out is overcome. Thus, greater resistance to flooding or wet-out of the electrochemically active layer of the composite electrode is obtained.

8. Claims 1-3, 9-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of the Japanese publication JP 06-44984 (herein called the JP'984).

As to claims 1 and 17:

(*Emphasis added*→) The AAPA discloses that the membrane electrode structure 10 (See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

The AAPA illustrates in FIGURE 15 and discloses a membrane electrode structure 10 used for the polymer electrolyte fuel cell and comprises a pair of electrolyte catalyst layers 3, 3 formed by integrating by an ion conducting polymer binder, catalyst particles consisting of catalysts such as Pt supported by carbon particles such as carbon black, a polymer electrolyte membrane 1 sandwiched between the electrode catalyst layers 3, 3; and diffusion electrodes 5, 5 that are laminated on the electrode catalyst layers 3, 3 (*Applicant's specification, paragraph bridging pages 1-2*).

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The AAPA further discloses that in the membrane-electrode structure 10, the electrode catalyst layer 3 is hydrophilic for the transference of protons or the elimination of water generated, and the like. On the other hand, the diffusion electrode 5 is configured such that a porous water-repellent layer 7 is formed in a carbon substrate layer 6 for the diffusion of gas. The diffusion electrode 5 is laminated on the electrode catalyst layer 3 through the water-repellent layer 7. In the membrane electrode structure 10, a separator is also included (*Applicant's specification, 1<sup>st</sup> full paragraph on page 2*).

The AAPA discloses mounting fuel cells, which are electrical apparatus, in vehicles and the like (*Applicant's specification, 2<sup>nd</sup> full paragraph on page 1*).

As to claims 2-3 and 9-13:

*Since the AAPA has admitted that the prior art method is the same as the claimed method except for the formation of the hydrophilic layer 8, thus, subject matter directed to any components of the membrane electrode structure 10 or its method of making but excluding the hydrophilic layer is already encompassed and therefore disclosed by the prior art method.*

**(Emphasis added→)** The AAPA discloses that the membrane electrode structure 10 (*See FIGURE 15 which shows an example of the structure of the conventional membrane electrode structure, applicant's specification at page 17, lines 8-10 and page 24, 1<sup>st</sup> full paragraph*) is obtained by the same above production method with the exception that the hydrophilic layer 8 was not formed. Thus, the difference between the prior art method and the claimed method, as disclosed by the applicant, is that the prior art method does not form a hydrophilic layer as instantly claimed.

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The AAPA discloses a method for producing a membrane electrode assembly as set forth the above. However, the AAPA does not expressly disclose the specific lamination of the hydrophilic layer.

The JP'984 discloses electrode for solid high polymer electrolyte fuel cell (TITLE) formed by laminating, press-bonding and sintering by hot pressing a hydrophilic reaction layer composed of hydrophilic and hydrophobic carbon blacks and polytetrafluoroethylene and a hydrophobic gas diffusion layer composed of hydrophobic carbon black and PTFE to obtain a gas diffusion electrode having water repellency (ABSTRACT). *These materials exhibit conducting and ion-conducting properties.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to laminate the hydrophilic layer of the JP'984 in the membrane electrode structure of the AAPA as the JP'984 discloses this provides an electrode having an excellent working characteristic as a gas diffusion electrode.

### ***Response to Arguments***

9. Applicant's arguments filed 12/05/06 have been fully considered but they are not persuasive.
10. First of all, in traversing the applied rejections, applicant appears to be arguing certain unclaimed limitations. For instance, throughout the entire remark section, applicant is articulating that: "*the resulting diffusion electrode is laminated on an electrode catalyst layer through the hydrophilic layer*", "*the hydrophilic layer is formed on the diffusion electrode and not the electrode catalyst layer*", the prior art does not disclose "*the step of forming a diffusion*

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*electrode to have a hydrophilic layer that is used to position the diffusion electrode on the electrode catalyst layer” and/or the prior art does not disclose “a method of laminating a membrane electrode structure by applying high-viscosity paste”.* In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In this respect, the examiner likes to further add that applicant appears to overlook the detail that the claimed invention in no way recites that: a) the only component of the diffusion electrode contacting the catalyst layer of the membrane is the hydrophilic layer, and/or b) that the water-repellent layer of the diffusion electrode does not contact the membrane, and/or c) the hydrophobic layer directly and only contacting the water-repellent layer. These items (a through c above) are critical for understanding the basis of the grounds of rejections and why applicant's apparent arguments stand far from being accurate and precise with the respect to the claimed invention. Absent any specific limitation in the present claims excluding interconnection of the foregoing components or specific structural arrangements preventing contact between those components, it is contended that the four grounds of rejection completely address all the claimed inventions.

Bear in mind that, as set forth in the prior office action, the only step/feature not disclosed by the AAPA (primary reference) is the formation of the hydrophilic layer applied (*directly or indirectly*) on the water-repellent layer and its positioning (*directly or indirectly, partially or fully*) between the diffusion electrode and the electrode catalyst layer. Nevertheless, multiple

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secondary references alleviate the AAPA's deficiency by unequivocally disclosing the combined use of hydrophilic layers with hydrophobic layers (water-repellent layers) in gas diffusion electrodes as instantly claimed by applicant. Concerning this matter, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. **(Emphasis supplied→)** Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

For instance, the AAPA in view of Landsman et al is still applicable because Landsman et al discloses hydrophobic layers 12 (water-repellent layers) and hydrophilic layers 13, particularly, hydrophilic layers 13 meet the structural requirement of being applied on the hydrophobic layers 12 and positioned between the electrolyte membrane 4 and carbon paper 10. Thus, it satisfies the claimed limitation.

Further, the AAPA in view of Heffler is also appropriate because Heffler requires both a hydrophobic layer 1 (water-repellent layers) and a hydrophilic layer 2 in working gas diffusion electrode, and the present claims do not establish a direct contact between both layers.

Yet further, the AAPA in view of Goldsmith is not an improper ground of rejection because Goldsmith is concerned with the inclusion of a hydrophilic layer (Col 6, line 30) and a hydrophobic layer (water-repellent layers) (COL 6, line 45) in a composite electrode. In this case, Goldsmith suggests to employ both layers in a gas diffusion electrode for the beneficial effects disclosed in the reference, and since no specific structural arrangement other than being

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“applied” and “positioned” is required in the claims, it can be said that such a combination of references does satisfy the claimed limitations of the present invention.

Finally, the AAPA in view of the JP’984 is meritorious because the JP’984 emphatically reveals a hydrophilic layer and a hydrophobic diffusion layer being laminated to obtain a gas diffusion electrode having water repellency contacting a polymeric membrane of a fuel cell. Thus, absent any specific structural limitation stipulating that the hydrophilic layer is placed directly over the hydrophobic layer, it can be fairly stated that this additional combination of references does meet all the limitations of the invention at hand.

Notice also that no specific technique(s) other than generic techniques such as “applying”, or “positioning”, or “laminating” is currently claimed in the present claims. Thus, any argument advanced by the applicant regarding the lack of specific technique for producing a membrane electrode structure is inapposite and not commensurate with the extension of the broadly claimed invention.

### ***Conclusion***

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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